GET SMART IN ACQUISITION LOGISTICS PLANNING

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Introduction

An Army concept known as Simulation and Modeling for Acquisition, Requirements and Training (SMART) is improving the implementation of acquisition policy and collaboration across a variety of Army communities. SMART can help achieve greater operational readiness by reducing life cycle costs (LCCs) and fielding systems more quickly.

This article covers five models that improve acquisition logistics policy implementation and collaboration to achieve SMART readiness and total ownership cost (TOC) goals. Any U.S. government agency or its contractors may use these models. Three of the five models are Army standard models. The other two, developed by the Army Communications-Electronics Command (CECOM), are stand-alone tools that also link to the Army standard models. Each of the five models is identified in Table 1 and is further described in the following paragraphs.

ASOAR

The Achieving a System Operational Availability Requirement (ASOAR) model is a tool for early-on analysis of reliability, availability, and maintainability (RAM) and supportability. The ASOAR model optimally allocates a system operational readiness rate requirement to determine the operational availability (Ao) goals for each end item being separately acquired. ASOAR end item Ao outputs can be used as Ao goal inputs for supportability optimization models when data for items within an end item become available. The ASOAR model uses a top-down analytical approach requiring only system- and end-item-level inputs. The ASOAR model helps to derive and generate system RAM requirements that support the user's readiness objectives early in the acquisition cycle. The model also permits early-on RAM and supportability trade-off analyses for "system-of-systems" situations. When equipment availability is considered, ASOAR results can be used with performance simulations to determine system effectiveness. The ASOAR model can be obtained from the CECOM Deputy Chief of Staff for Operations and Plans (DCSOPS) Systems Analysis Division. The Systems Analysis Division will also perform analyses for government agencies and provide a help desk for all ASOAR users.

SESAME

The Selected Essential-Item Stock for Availability Method (SESAME) model is the Army standard initial provisioning model that optimizes the mix and placement of spares to achieve an end item Ao requirement or the maximum Ao for a dollar goal input. Essentially, the readiness goal is achieved at a minimum cost or the maximum amount of readiness is bought for an initial provisioning budget. To use SESAME, the maintenance concept for each essential item must be known or proposed. SESAME can also be used in an evaluation mode to estimate the Ao being proposed or experienced. This Ao is based on the proposed sparing of items, their demand rate, and logistics response times associated with their support concept. The Assistant Secretary of the Army for Acquisition, Logistics and Technology strongly encourages using SESAME to determine initial spares requirements. The SESAME model and training can be obtained from the Army Materiel Command's (AMC's) Army Materiel Systems Analysis Activity.

COMPASS

The Computerized Optimization Model for Predicting and Analyzing Support Structures (COMPASS) is the Army standard level of repair analysis (LORA) model that optimizes

Table 1.
Linked/Integrated Army Models

Acronym	Model Name	Type
ASOAR	Achieving a System Operational Availability Requirement	Readiness
SESAME	Selected Essential-Item Stock for Availability Method	Readiness
COMPASS	Computerized Optimization Model for Predicting and Analyzing Support Structures	Readiness and Cost
ACEIT	Automated Cost Estimating Integrated Tools	Cost
LCET	Logistics Cost Estimating Tool	Cost

Table 2.
When Ao Optimization Models Can Be Used

	RAM REQUIREMENTS EVALUATION	SOURCE SELECTION EVAL WITH LRU DATA	SUPPORTABILITY OPT PRIOR TO FIELDING	EQUIPMENT TEST & EVALUATION
ASOAR	✔		✓	
SESAME - EVALUATION MODE		✔		✔
SESAME - OPTIMIZATION MODE		✓	✔	
COMPASS - EVALUATION MODE		✔		
COMPASS - OPTIMIZATION MODE		✓	✔	

✔ - Applicable Tool ✓ - Supplemental Tool

maintenance concepts to achieve an end item Ao at the least total cost. A LORA determines where each item is cost-effectively repaired. SESAME algorithms are embedded in COMPASS to simultaneously optimize maintenance and supply support. Thus, COMPASS enables supportability optimization prior to fielding. COMPASS can also be used as a source of repair analysis (SORA) model. A SORA model determines how each item is cost-effectively repaired. Therefore, COMPASS can be used to compare the total costs associated with government depot repair versus contractor depot maintenance in achieving the same Ao goal. Of course, such a best-value analysis would apply to noncore depot work.

COMPASS was designed to determine steady-state, full-deployment LORA and SORA decisions by comparing the net present-value logistics cost estimates that vary by maintenance policy. COMPASS requires information about the line replaceable units (LRUs) used to restore the end item and higher failure rate shop replaceable units (SRUs) used to repair LRUs. Thus, it has the fidelity to permit a RAM analysis of the detailed design to show life-cycle support cost impacts associated with each item modeled in the equipment. Support costs associated with design improvements can be compared to the baseline design to assess the improvement's potential to reduce life-cycle support costs. This helps supportability analysis to become an integral part of systems engineering. The COMPASS model and training can be obtained from the AMC Logistics Support Activity.

ACEIT

The Automated Cost Estimating Integrated Tools (ACEIT) model is an Army standard for LCC estimating. ACEIT is an automated architecture and framework that integrates several software products to be used for cost estimating. ACEIT integrates cost-estimating functions and allows the cost analyst to tailor data for the project. The tool is often used to generate program office estimates and LCC estimates for project managers. The precision of the estimates is dependent on the cost-estimating relationships or methodology of other models and data used to feed ACEIT. With regard to all costs except logistics, past usage of ACEIT tends to provide credible acquisition cost estimates. The ACEIT model and training can be obtained from the Army Cost and Economic Analysis Center.

LCET

The Logistics Cost Estimating Tool (LCET) is a user-friendly model that estimates all time-phased logistics costs associated with equipment readiness, use, and support. LCET consists of two modules: Time-Phased COMPASS and the Logistics Cost Spreadsheet. The Logistics Cost Spreadsheet may be used in conjunction with Time-Phased COMPASS or by itself. Using it in conjunction with Time-Phased COMPASS requires more detailed data, but this combination provides a more credible cost estimate than using it as a stand-alone tool. The data file of a selected COMPASS run may be imported to LCET and the time phasing of support costs computed. LCET also computes the worth of a warranty to automatically adjust the time-phased COMPASS results. The logistics costs not covered by COMPASS can be computed using the LCET spreadsheet. All the logistics cost results in LCET can be electronically copied into ACEIT. Therefore, LCET improves the estimation of logistics costs and can supplement ACEIT to provide more credible life-cycle logistics cost estimates. The CECOM DCSOPS Systems Analysis Division provides the model and a help desk for all LCET users.

Operational Readiness

Table 2 depicts when to use models that optimize supportability to Ao requirements or goals. ASOAR can be used early enough in the acquisition cycle to evaluate RAM and supportability requirements. ASOAR analyzes the mission reliability aspect of RAM, while COMPASS and SESAME analyze the logistics reliability aspect of item demand rates requiring equipment support. If maintenance policies for LRUs and high failure rate SRUs are proposed, COMPASS can be used in source selection evaluations to determine RAM-related support costs. Additionally, if LRU sparing is proposed, SESAME can be used to evaluate the Ao proposed in source-selection evaluations. COMPASS and/or SESAME are highly recommended to determine optimum maintenance or supply concepts prior to equipment fielding. If SESAME is used to initially provision LRUs, the model can later be used to quickly evaluate the end item's Ao based on the reliability determined from equipment test or experienced data.

LCC

All of the models support early, informed decisionmaking across the domains of many different communities to help provide collaborative analyses. Used together in an integrated manner, COMPASS, LCET, and ACEIT are useful for estimating equipment LCC by significantly improving the fidelity and credibility of logistics cost estimates in LCC estimates. Models that improve LCC estimating aid in the analysis and management of TOCs, leading the way to TOC reduction. The rigorous computation of yearly logistics costs in LCET enables more accurate computing of system TOC when used with ACEIT.

The integration of COMPASS, LCET, and ACEIT provides a structured approach to optimize supportability and compute LCC concurrently. COMPASS optimizes among viable support concepts to achieve an inputted Ao goal. It determines the least cost initial provisioning associated with each potential maintenance concept. COMPASS also optimizes among maintenance trade-offs to determine whether it is more cost-effective to use 2-level, 3-level, or 4-level maintenance support; return LRUs or SRUs to depot for repair; use organic or contractor depot repair; and throw away or repair items. The Time-Phased COMPASS module in the LCET can be used to compute RAM and maintenance-related costs on an annual basis. The LCET spreadsheet also estimates the other logistics costs not covered by COMPASS. ACEIT becomes a much better LCC estimating tool when LCET results are electronically copied into it. This also helps to improve the modeling of trade-offs to LCC. Applying the integrated models truly helps to make supportability equal to cost, schedule, and performance when acquiring equipment.

Conclusion

SMART improves collaboration and achieves more operational readiness for less LCC by using modeling and simulation during equipment development. The Army models described in this article already exist and have an excellent potential to accomplish some of the SMART objectives. DOD and Army acquisition policies encourage use of these linked or integrated models, but they are seldom applied today. To better accomplish SMART objectives and implement acquisition logistics policies, individuals need more training to improve awareness and promote culture changes. To significantly improve model usage and collaboration, all Army communities need to accept and use Ao more as a user requirement. Identifying Ao as a key performance parameter in requirements documents will promote increased usage of supportability optimization models. Additionally, if contractor logistics support (CLS) is going to be used extensively, Ao may be evaluated in CLS buys because the contractor's designed reliability and maintainability, proposed sparing, and logistics response times are driving the end item's Ao prior to fielding and readiness after fielding. Another key to significantly improve model usage and collaboration is to start optimizing supportability in LCC evaluations. Applying these linked acquisition logistics models will lead to reduced TOCs in achieving readiness requirements. When less money is spent to achieve system effectiveness, additional dollars are available to purchase more equipment or to buy increased performance, which in turn improves operational effectiveness.

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